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Title: Development of a Waste Vault Directional Assay System (VDAS)

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Intended for: The document is a Penta Chart to provide to NA-241 SG Tech on the new detector they are funding

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Development of a Waste Vault Directional Assay System (VDAS)

VDAS – Portable neutron/gamma detector with directional capability that can operate in high dose rate environments

Background/State of the Art

- Waste measurement systems are generally customized to a particular facility and/or geometry and not able to be applied broadly to different waste facilities.
- Also, the current state of the art generally doesn't have directional capabilities – systems are designed for fixed geometries

Approach, Metrics and Outcomes

MAIN GOAL

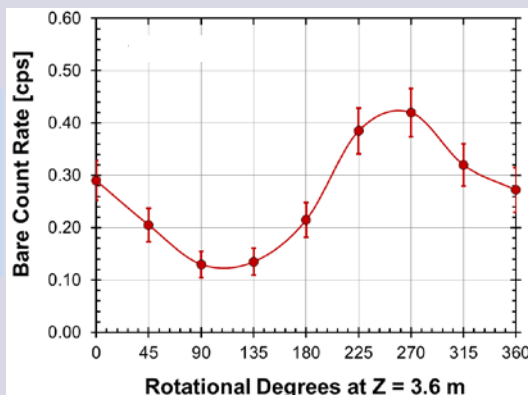
- The goal is to have a TRL 8 instrument with demonstrated capabilities at the LANL RP-2 facility and is ready for an INSEP field trial in a partner country

Impact

This technology is applicable to improving waste measurements for:

- Facility mass declaration to the IAEA
- IAEA verification during inspections
- Nuclear facility decommissioning
- Long-Term R&D goals addressed
 - Safeguards for waste and scrap measurements
- Start of FY17 TRL = 6**
- End of FY17 TRL = 8**

Schematic of directionality concept using Cd & differential moderation. The new VDAS system will have the added capabilities of axial rotation and being more adaptable to different facility infrastructure.



HOW IT WORKS

The basic concept of VDAS is based on previous systems developed and implemented in INSEP partner countries:

- Chernobyl Radiation Assay Detector (CRAD)
- $^{10}\text{B}+^3\text{He}$ Continuous Monitor (BHCM)

VDAS will be designed and fabricated using COTS technology.

ASSUMPTIONS, LIMITATIONS & CONSTRAINTS

- VDAS will be designed to operate in gamma dose rate environments up to 500n R/hr

Goals/Action Plan

Current FY

- Design and develop VDAS for a broad range of waste composition
- Fabricate VDAS
- Perform absolute calibration, characterization, and stability measurements of VDAS

Future FY

- Field test VDAS with INSEP partner country

Innovation

- The VDAS design will include capabilities for remote deployment and adaptability to a broad range of facility infrastructures.
- VDAS will use proven commercially available ^3He or ^{10}B tubes (γ -rate dependent) and standard PDT preamplifier electronics.
- Added functionality of neutron/gamma directional sensitivity will be achieved by using differential moderation of high density polyethylene and strategically placed Cd absorber filters and shielding for gammas.

Team

All Partners (Organization Level Only)

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